Centrifugally Cast Hydraulic Accumulator Bodies

Discussion of Benefits

Background

Fluids are practically incompressible and cannot therefore store pressure energy. The compressibility of a gas is utilized in hydropneumatic accumulators for storing fluids. Piston accumulators are designed on this principle, using nitrogen or other inert gases as the compressible medium. A piston accumulator consists of a fluid section and a gas section with the piston acting as the barrier between them. The gas section is precharged with gas. The fluid section is connected to a hydraulic circuit so that the piston accumulator draws in fluid when the pressure increases thus compressing the gas. When the pressure is released, the compressed gas expands and forces the stored fluid into the circuit. Hydraulic Piston Accumulators, then, can be used to store energy, act to equalize forces (shock absorption) or to actuate equipment.

Benefits

- Alloy Flexibility
- Quantity Flexibility
- Non-Standard Sizes
- Heavy Wall Thickness

Spuncast Customer Service

Numerous processes can be used to produce **Hydraulic Accumulator Bodies**, with each being appropriate and economical in specific situations. If flexibility of product and quantity are desired considerations, contact Spuncast Sales Engineers, who can assist you in determining whether centrifugal casting would be an economical option for your particular hydraulic application.

For the past 10 years, Spuncast, Inc. has been manufacturing and selling hydraulic accumulator bodies to manufacturers of piston accumulators. Our customers' applications have included a variety of equipment actuation functions on U.S. Navy submarines and surface ships, a wide array of functions for energy storage and actuation on offshore oil platforms and many other uses. Recently, there appears to be a potential for applications on wind turbines, specifically for nacelle yaw and blade pitch operations.

The starting material used in the production of hydraulic accumulators can be produced by several processes. Hot extruded tubing, forged tubing, DOM (Drawn-Over-Mandrel) tubing, even tubing machined from bar stock can be used but many customers have found cost efficiency using centrifugal castings.

Alloy Flexibility

Our customers have requested a wide variety of alloys for hydraulic accumulator bodies. These have included austenitic stainless steels such as CF8M (316 SS) and CG8M (317 SS), duplex stainless steels such as a modified version of ASTM A 890 Grade 1B (similar to Ferralium 255® *), martensitic stainless steels such as CA15 and CA6NM (410 SS and a modified 410), as well as high strength/low alloy steels like 8630 material.

Because accumulators are pressure containing vessels, the quality of the material is commonly governed by very stringent ASME or MIL specifications. Through tight metallurgical and process controls and a quench facility designed specifically for tubular parts, Spuncast is able to achieve excellent mechanical properties, excellent corrosion resistance, along with tight dimensional and surface control. All of this is accomplished with an extremely high degree of repeatability.

Alloys can be tailored to specific property requirements. Spuncast has the in-house metallurgical experience to satisfy individual customer needs.

Quantity Flexibility

Hot extruded tubing, DOM tubing or other mill products can be very economical when purchased in large quantities or “mill runs”. Because each centrifugally cast tube is usually an individual furnace heat, single pieces or small quantities do not drastically change the price. While larger runs are also easily accommodated, centrifugal castings are particularly suited to smaller, job-specific runs.

Delivery of Non-Standard Sizes

The centrifugal casting process lends itself extremely well to non-standard sizes. The dies, while not inexpensive, are manageable both financially and in lead time. The die forms only the outer diameter of the casting while the amount of molten metal poured sizes the inner diameter. When engineers design cylinders for a specific duty, there are many times when standard pipe sizes are not usable. The diameters may not be standard or the desired wall thickness may not be available. Centrifugal castings are an excellent solution to this dilemma.

Availability of Heavy Wall Thickness

Centrifugal casting facilitates the production of heavy walled cylinders. Wall thicknesses of 30 mm to 65 mm are possible and common. Other methods of manufacturing are either not capable of these dimensions or will be cost prohibitive. Centrifugal casting offers an economical means to meet design requirements.

Summary

There are numerous processes that are used to produce hydraulic accumulator bodies. Each can be appropriate and economical in specific situations. The benefits outlined here show that the centrifugal casting process definitely should be considered when designing and purchasing accumulator bodies. Flexibility of product and quantity is a primary benefit of the centrifugal casting process.

Customer service is what sets Spuncast apart from other centrifugal casting suppliers.

Spuncast Sales Engineers are available to help determine if centrifugal casting would be an economical option for a particular hydraulic application.

** Ferralium 255 is a registered trademark of Langley Alloys Ltd.*